A hundred, five hundred, a thousand maimed men seen en masse forcibly demanded the elimination of carelessness and mishandling and the institution of better methods and higher standards.

Splint standardization, immobilization at the earliest practical moment, skeletal traction, traction-suspension in frames of the Balkan type prevented countless deformities and saved hundreds of lives.

These methods were widely applied to industrial injuries after the war, and with similar good results. Then began an insidious, but no less dangerous drift back toward obsolete prewar methods. The human wreckage of civil industry is not disclosed en masse as was the human wreckage of war. The newer and better methods are a far greater tax upon the time and ability of the surgeon. Their application usually costs more in primary and obvious expense than do perfunctory and obsolete methods. The salvage value of high standard reconstruction surgery is often obscured when the price of life and limb is set as low as present custom tends to place it in industrial workers.

Doctor Shoemaker has clearly pointed out that shortening, angulation, malunion and stiff joints must be avoided. He has warned us against shock and hemorrhage, and has stressed the value of efficient early manipulative reduction. One could wish that space had permitted him to speak in some detail of modern methods of splinting, skeletal traction and suspension which, if efficiently applied, go so far toward avoiding disasters and toward facilitating reconstruction of fractured long bones.

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EDGAR L. GILCREEST, M. D. (384 Post Street, San Francisco).—I wish Doctor Shoemaker might have emphasized more the importance of immediate replacement after fracture. Under this caption he arbitrarily includes that time from the day of injury up to three weeks. I believe that we should urge more and more very early reduction. In fact, I believe that we should teach our students that a fracture is an acute emergency. It is an erroneous and pernicious idea that one should wait until the swelling subsides before attempting reduction. Immediate or very early reduction often prevents much swelling. Repair does not go on indefinitely; sooner or later it ceases; therefore it must be conserved and not wasted.

In accomplishing these reductions Doctor Shoemaker has pointed out how to avoid shock. This should always be borne in mind. Frequently in fracture cases too little attention is paid to the trauma of the surrounding tissues. There is no simple fracture. Every fracture is accompanied by varying degrees of contusion and laceration and of hemorrhage into the adjacent structures.

The cause of unsatisfactory results in reconstruction of the long bones is that too little attention is still given to the consideration of the anatomy and physiology of the part. Since the popularization of the treatment of fractures by extension, exact reduction of the fracture has often been neglected. It is folly to sacrifice the attempt at primary reduction for other methods. Until good reposition has been obtained we should not be satisfied. I have in some cases made three or four attempts before proper reduction and alignment have been secured. As Doctor Shoemaker has so ably pointed out there are a number of fractures which do not permit primary reduction. These lie on the border line between fractures requiring conservative or nonoperative treatment and those requiring operative intervention. The methods pointed out by Doctor Shoemaker have been our allies for years. We should more frequently hesitate to leave the fields of tried and proved experience to go romping after the butterflies of untried methods in our desire for the new and more spectacular. Rather we should perfect ourselves in standardized methods.

SMALLPOX AND VACCINATION*

By FREDERICK EBERSON, M. D.
San Francisco

DISCUSSION *by J. L. Pomeroy, M. D., Los Angeles; Walter M. Dickie, M. D., San Francisco.*

MODE OF TRANSMISSION

SMALLPOX is a disease that spares no class of people. Its extent cannot be compared with that of typhoid fever, cholera, typhus fever, or tuberculosis, the prevalence of which is effectively lessened by improved methods of sanitation, for the exact mode by which smallpox is conveyed is not definitely understood. No one as yet has discovered the organism or other agent that may be responsible for the disease. For that matter, nobody knows what electricity is, but who cares to play with a live wire? However, it is commonly believed that the infective substance, or virus, as it is called, enters the nose or throat and from these places, through a local injury, enters the blood and causes a general infection of the system. There does not seem to be any doubt that the smallpox virus is contained in the lesions of the skin because direct contact is certain to spread the disease to other persons.

AN ANCIENT AND MODERN SCOURGE

Smallpox was at one time much more common and far more deadly in its ravages than it is now. There are two reasons for this fact. First, a new disease invariably wipes out the population whenever it finds a virgin soil. The scourge travels along like flames that lick dry timber in a burning forest. Second, methods of prevention and treatment of the disease are known today that were unknown in the past.

Introduced into the New World by the Spaniards about fifteen years after the discovery of America, within a short time smallpox had claimed about three and a half million persons in Mexico. More than one-half of the twelve million American Indians were stricken. Later, in the year 1707, almost 40 per cent of the total population of Iceland perished to the number of twenty thousand.

In more recent times, during the years 1893 to 1897, almost four hundred thousand persons died of the disease in sixteen countries and of this number Russia alone lost over 275,000. For many years China had been swept by smallpox and enormous populations wiped out, but today the disease is no longer so deadly, since the pock-marked and disfigured faces of the natives bear witness to the fact that nearly everyone has had the disease and is therefore now immune to another attack. All the previous waste of human life seems the more terrible in view of the simple preventive measure given to us by modern science.

DISCOVERY OF VACCINATION

The prevention of smallpox depends chiefly upon vaccination. It was one of the first weapons

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* Radio lecture, KFRC, November 5, 1928, sponsored by the University of California Medical School.

given to man in his fight against disease and is therefore of unusual historical interest. Vaccination by the use of material taken from actual cases of smallpox was known to ancient China, whence the Turks introduced the custom into their own country. One might almost say that taking smallpox as a precaution against the disease became in Turkey a form of diversion as pleasant as the waters of health baths in other countries.

Lady Mary Montague.—Early in the eighteenth century Lady Mary Montague, who was living in Turkey, wrote home to England about this practice and had her daughter vaccinated. The idea spread and vaccination soon became popular in Great Britain. Of course this method had its obvious dangers and disadvantages, but it was not until seventy-five years later that science found a better way.

Edward Jenner.—The world gives credit in modern times to Dr. Edward Jenner of England for this wonderful discovery, evolved after careful scientific and logical methods of experiment. He demonstrated the mechanism whereby cowpox, a disease of the cow, can be transferred to humans and the mild form of infection thus produced is in turn capable of warding off the serious smallpox which is a human disease. Despite vigorous opposition on the part of those who take pleasure in obstructing new ideas, he succeeded in winning governmental support and numerous adherents, thus making it possible for him to put his discovery to a thorough practical test.

The first human being to be vaccinated by Jenner was his own eighteen months old son, an evidence of implicit faith in his own discovery. It was in the same year, 1796, that this young country doctor transferred the cowpox material from the hands of a dairymaid to an eight-year-old boy, who, when subsequently inoculated with virulent material taken from a smallpox pustule, remained well. Thus vaccination came to be known as such from the Latin word "vacca" for cow. How this idea of vaccination developed in Jenner's mind is of some interest.

Simon Jesty.—It was a tradition of the countryside that cowpox protected against smallpox. Persons that did the milking on the farms often contracted the disease from the cow's udders and developed pustules on the hands and arms. These persons were considered lucky because the village folk always said, "If you've had cowpox you can't catch smallpox." This thought was so strongly ingrained that a farmer of Devonshire named Simon Jesty determined to give cowpox to his wife and sons as a protection against smallpox. This was in 1774, twenty-four years before the publication of Jenner's work.

Jenner supposedly knew nothing of Jesty's experiment, but was familiar with the general tradition regarding smallpox and cowpox. A simple country practitioner, Jenner, after settling down to the humdrum life at Berkeley, where he lived, devoted his attention to the study of this terrible disease that had carried off all but one thousand of a population of fifteen thousand persons in a nearby town only a few years before. As is usually the case, Jenner was not honored in his own country until the outside world had already recognized his achievements, and it was not until 1802 that the British Parliament voted him $40,000 in appreciation of his discovery, and in 1806 voted him a further grant of $100,000.

In passing, one is tempted to call attention to the munificence of these grants, in contrast to the indifference of the American Congress to Reed and his co-martyrs, who, through their discoveries, relieved the Western Hemisphere of the yellow fever peril.

BENEFITS OF VACCINATION

What is the use of vaccination, some may ask? There has always been a prejudice against this procedure because of general lack of knowledge concerning the great benefits to be derived from the simple preventive measure. Vaccination confers an immunity or resistance to the smallpox virus. Within eight or nine days this immunity develops in the body and is retained thereafter for a period of about seven years, after which the individual loses this resistance and becomes again susceptible to the disease, even though the disease under such conditions usually attacks the human host in much milder form. The protection insured by vaccination may be made continuous and more certain by taking the treatment every five years.

The idea of vaccination is simple and devoid of mystery. Does it not seem reasonable to imitate with a mild and harmless form of disease a bodily condition that will normally result only if one has been lucky enough to survive a dangerous infection? For it is only when we recover from smallpox that we are guaranteed freedom from other attacks. Why should one take the risk of succumbing to a horrible disease in order to profit by the immunity that recovery confers when it is possible to win such immunity by artificial means without danger and without disfiguration?

The risk attending vaccination has been grossly exaggerated by antivaccinationists and their supporters. Vaccination is not dangerous. Cleanliness prevents any complications, and the danger from the vaccine itself is a bugaboo that misinformed medical quacks have set up to frighten the public. The methods of vaccination in use today are certain and safe, and even a sore arm is a rare occurrence if the site of inoculation is kept clean and the arm rested from unduly severe movements. The benefits to be derived from vaccination are so great that any possible danger, even if it did exist, would be well compensated.

VACCINATION AND THE COMMUNITY

Vaccination gives the individual protection against smallpox and at the same time affords an almost perfect protection to the community. To remain unvaccinated is to deprive the community of the protection due it. In countries where vaccination is compulsory the number of cases of smallpox and deaths from the disease have been remarkably low as compared with those countries

where vaccination is neither compulsory nor practiced voluntarily to any extent.

STATISTICS

One might give endless lists of figures showing plainly what vaccination has done to prevent disease and death.

Germany.—In Germany since 1874, when vaccination and revaccination were made compulsory by law, there had been only two deaths from smallpox in the huge German Army up to the year 1916. From the years 1901 to 1910 in Germany there were only 380 deaths from smallpox, and during the same period in England and Wales, with a population half the size of Germany's, there were 4300 deaths. More recent figures show that Germany, resuming her vaccination campaign after the Great War, reduced the number of smallpox cases from 688 in the year 1921, to 215 in 1922, and to 17 in 1923.

Other Countries.—If we compare conditions in certain countries during the period of 1886 to 1889, when smallpox was extremely prevalent, we find in Austria 11,000 deaths, in Italy 16,000, in Spain 11,000, and in Russia 21,000. Scotland at this time, with compulsory vaccination, had only twelve deaths or one in about 325,000 persons, and in 1923 only three cases were reported.

Soviet Russia.—Today Soviet Russia has less smallpox than the United States! In 1919, when vaccination became compulsory, there were 169,500 cases of smallpox, two years later 68,500 cases, and after the fifth year, 31,000 cases.

Hawaii.—Hawaii, with compulsory vaccination and despite its situation at the crossroads of the East, has had but fourteen cases of smallpox in the past eleven years.

Boston.—In our own country we have ample evidence of a similar kind to show how vaccination prevents smallpox and lessens mortality. Boston had a serious epidemic in 1872 with 3722 cases of smallpox and 1040 deaths. Two years later compulsory vaccination of children entering school was enforced and smallpox became so rare that the majority of physicians now living in Boston have never seen a case.

New York State and New York City.—The best example of what vaccination will do is found in New York State. In 1923, among 7,200,000 persons living in the crowded districts where children must be vaccinated before entering school, there were 668 cases of smallpox. Among 3,185,000 persons living in the small towns and rural districts where laws for compulsory vaccination did not exist, the number of cases was 3080, or more than twelve times as many per capita of population. Incidentally, in New York City there has not been a death from smallpox for the past fourteen years.

EFFECTS OF NEGLECT

Kansas City.—Let us now consider the other side of the picture. Only a few years ago, in Kansas City, where vaccination was not practiced because certain antivaccination societies had exerted a powerful and baneful influence, an epidemic of smallpox occurred and virtually every case had a fatal result. The explanation is simple. The disease had never been common in that locality. There was no natural immunity due to recovery from the disease, nor had artificial immunity been obtained through vaccination. The disease, therefore, found a new and virgin territory with highly susceptible people and the consequence was a high mortality. This might have been avoided had the parents listened to reason and common sense and not paid so much attention to prejudiced antivaccination propagandists.

Philippine Islands.—Before the Americans occupied the Philippine Islands, toward the close of the last century, the known deaths from smallpox ranged from forty to fifty thousand a year. Following a vaccination campaign, the death rate was reduced to between seven and eight hundred a year. These deaths usually occurred among babies and could generally be traced to the neglect of native municipal officers. This was sufficient proof of the value of vaccination, but in 1918 an epidemic of smallpox broke out with 47,000 cases and 16,000 deaths. In Manila, the capital of the Islands, more than 60 per cent of the population were stricken.

The objectors to vaccination thought they had damning proof against it, but an investigation revealed the true situation. It was found that the American health officers had for some years been replaced by native officers who were guilty of neglect. They threw away the vaccine viruses and made false reports on the number of cases vaccinated. In one instance the report of an ambitious native officer showed that he had vaccinated fifty thousand more people than the whole population of the province! Further investigation made the case for vaccination much stronger because 93 per cent of the people that died had never been vaccinated and 90 per cent of the cases occurred in children that had been born since the natives took over the duties of vaccination. When the results of the investigation became known, the Americans started another health campaign and smallpox has since been a rare disease in the Philippines.

California.—The situation in California should not give us cause to advertise what has been taking place. At one time there was a law in California requiring vaccination of children before they could attend school, but in 1911 the antivaccinationists succeeded in having the law changed so as to permit conscientious objection. As a result, 80 per cent of the children in some communities are unvaccinated. In 1923 this law had all its teeth pulled and the people of California, as Doctor Kellogg of the University of California has said, were given the privilege of enjoying all the smallpox they wanted.

Because of this laxity, smallpox in California is becoming alarmingly prevalent among children. Figures from the State Board of Health show that from 1912 to 1916 the cases of smallpox in California averaged 511 a year, from 1917 to

1921, 2683, and from 1921 to 1926, 4263 a year. The average annual deaths in the same periods were 9.4, 9.8, and 74. In 1924 there were 56 deaths among 10,000 cases. In 1926 there were 236 deaths among 2700 cases. In 1927 there were 984 cases with five deaths and for nine months of this year 911 cases with one death.

Great Britain.—Similarly in Great Britain we see the effects of such laws as exist in California. In keeping with the results of conscientious objection to vaccination in Great Britain, smallpox has increased tenfold between the years 1917 and 1924 as compared with the years 1910 to 1917. There were 847 cases in the first period and 8251 in the second.

DANGER IN DELAY

The horrors of smallpox with its terrible pustules covering the body, the puffy eyes closed by festering masses, the blindness that frequently results, the permanent disfiguration when death does not occur—all these things are too well known to require further comment. The appeal to common sense is all that should be necessary. Vaccination against smallpox is the best safeguard for your children, yourselves, and the community. Very often parents are simply careless and negligent and put off vaccination from day to day. It may be too late. Delay is dangerous. Children should be vaccinated early; the vaccination should not be postponed until the the children are ready to enter the schools.

It is essential that little or no heed be given by parents to the advice of neighbors on medical subjects. There are physicians who are better qualified to give advice. Any doctor, however, who tells you that vaccination is unnecessary or dangerous, might be termed hopelessly behind the times and is in the unfortunate position where he is unable to present reliable and scientific facts to warrant such an opinion. Up-to-date scientific medicine teaches prevention, and prevention is as important as cure. In few diseases is this more true than with that dread and disfiguring scourge, known as smallpox.

University of California Medical School.

DISCUSSION

J. L. Pomeroy, M. D. (330 North Broadway, Los Angeles).—It is true that the people of California are subject to constant danger from smallpox. It is a question of considerable moment, however, as to what can be done about it. Personally I believe that compulsory methods are not possible to secure in this state. As a result we must fall back on a constant educational campaign. In this respect the medical profession itself is not doing very much. If every physician in the State of California would urge vaccination on all of his clientele and especially the newborn children before the end of their first year, we should scarcely need to worry about the situation. The conscientious objector would be about the only person susceptible and would get his due reward. The facts are, however, that very few physicians are really practicing preventive medicine and even during an epidemic many of the physicians object to the wholesale vaccination carried out as an emergency measure by the health departments.

Such papers as this should serve as a reminder to the medical profession in general to do everything possible in their own field and toward the education of those susceptible of education and let nature take care of the rest.

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Walter M. Dickie, M. D. (State Building, San Francisco).—It is true that more cases of virulent smallpox have been found in California since the repeal of the Vaccination Act, but it is believed that this is due to the importation of virulent strains from Mexico and the Orient as well as to the decreased number of immunized individuals within the state. Vaccination against smallpox is the oldest efficient weapon in preventive medicine, and its virtues are as well known and have been preached as consistently as have those of any other procedure in public health administration. It would seem that vaccination is available for all who may desire to take advantage of the safeguard that it provides. Parents and physicians have definite responsibilities in making certain that their children and patients, respectively, are vaccinated successfully. Health authorities have the undoubted right to take drastic action in the control of epidemics of smallpox, but when epidemics are not present the responsibility for securing protection against this disease rests upon the individuals concerned far more heavily than it does upon health officials.

THE UNTOWARD EFFECTS OF PROTEIN THERAPY IN OPHTHALMIC PRACTICE*

By M. N. Beigelman, M. D.
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Discussion *by Otto Barkan, M. D., San Francisco; George Piness, M. D., Los Angeles; A. Ray Irvine, M. D., Los Angeles.*

Primum sit non nocere.

HARDLY any other therapeutic method has attracted as much attention in the last decade as the nonspecific protein injections or the so-called "milk" therapy. The undoubted beneficial results of this treatment in various fields of medicine and the theoretic importance of the subject in regard to modern immunology stimulated a great deal of work—clinical, as well as experimental. Still a number of problems concerning the action of proteins, the dosage, the intervals, the indications and contraindications remain unsettled.

The object of this paper is to present certain facts and considerations in regard to one of these problems—the untoward effects of protein therapy and the methods of their prevention.

The voluminous literature on the use of foreign proteins in ophthalmic practice presents a striking variety in the complications arising from protein treatment. While some authors report large series of cases without mentioning a single untoward occurrence, others stress serious general

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